

Addiction is a brain disease, and it doesn't matter: prior choice in drug use blocks leniency in criminal punishment

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Addiction is a Brain Disease, and it Doesn't Matter: Prior Choice in Drug Use Blocks
Leniency in Criminal Punishment.

Nicholas Sinclair-House

School of Psychology, The University of Sussex

John J. Child

Birmingham Law School, The University of Birmingham

Hans S. Crombag

School of Psychology and Sussex Neuroscience, The University of Sussex

Author Note

Nicholas Sinclair-House and Hans S. Crombag, School of Psychology and Sussex Neuroscience, The University of Sussex, Brighton, East Sussex, BN1 9QG, UK.

John J. Child, Birmingham Law School, The University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK.

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Correspondence to: Hans S. Crombag, School of Psychology & Sussex Neuroscience,

The University of Sussex, Brighton, BN1 9QG, UK. Email: h.crombag@sussex.ac.uk

Abstract

Our aim was to explore how (neuro)scientific understanding of addiction as a brain-disease impacts criminal sentencing decisions in courts in England and Wales, where legal rules concerning intoxication, prior-fault and mental disease conflict, and sentencing guidelines lack clarity. We hypothesized that despite significant neuropsychiatric overlap of addiction and other brain-disorders, variables in relation to etiology would moderate magistrates' sentencing decisions in cases involving addicted offenders. Using a questionnaire-based, quantitative design, and combining frequentist and Bayesian analysis approaches, we probed court magistrates' sentencing decisions, and underlying rationale, for defendants presenting with brain damage resulting from a (fictional) disease, addiction to heroin, or more complex, mixed etiologies. When identical neuropsychiatric profiles resulted from disease, but not heroin addiction, prison sentences were significantly reduced. Study 1 ($N=109$) found the pivotal factor preventing addiction from mitigating sentences was perceived choice in its acquisition; removing choice from addiction increased the odds of sentence reduction (~20-fold) and attaching choice to disease aggravated or reversed earlier leniency. Study 2 ($N=276$) replicated these results and found that when heroin use led to disease or *vice versa*, magistrates found middle ground. These differences were independent of the age of first drug use. Finally, evidence of addiction was more likely to evoke punishment considerations by magistrates, rather than rehabilitation. Consistent with legal rules relating to intoxication but running counter to norms around mental-illness and choice, our results demonstrate the need for greater clarity in sentencing guidance on addiction specifically, and mental disorders more generally.

Keywords: Neuroscience, sentencing, addiction, criminal responsibility, capacity, mental illness.

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Contemporary neuroscience offers us ever greater insight into the addict's brain and how drugs interfere with normal structure and function in brain areas like the prefrontal cortex (PFC), a region implicated in executive function, rational decision-making and impulse control. Some have even pointed to the PFC as the neural substrate for moral reasoning (Greene, Nystrom, Engell, Darley, & Cohen, 2004; Sapolsky, 2004). Such findings, and the biomedical 'addiction as a brain disease' model they inform, raise legitimate questions over the extent to which addicts possess the requisite cognitive and volitional capacities to be held morally or criminally responsible for their actions in the same way as non-addicts (e.g., Hyman, 2007; Kennett, Vincent, & Snoek, 2014; Yaffe, 2011). As captured by criminal law theorist H.L.A. Hart, just punishment requires that "those whom we punish should have had, when they acted, the normal capacities, physical and mental, for doing what the law requires and abstaining from what it forbids" (Hart, 1968, p. 152). But what does it mean to lack 'normal capacities'; and what, if any, are the legal implications for addicts?

Hart's dictum is recognized in the criminal law when deciding whether defendants deserve *any* punishment, at the so-called 'liability stage'. We see this, for example, where a defendant's mental disorder satisfies the insanity defense; for children below the age for criminal responsibility; and more generally where a defendant's mental impairment explains a lack of mental fault (*mens rea*) or causes involuntariness in conduct (undermining the voluntary act requirement, often applied through the defense of automatism). The legal rules governing the liability stage have been subjected to detailed and sustained scrutiny by legal scholars, and neuroscience increasingly percolates into these debates to challenge assumptions (e.g. Catley & Claydon, 2015; Jones, Wagner, Faigman, & Raichle, 2013; Steinberg, 2013). However, the dichotomous (guilty/innocent) nature of the liability stage

means that thresholds must be identified; and as we see across jurisdictions, dominant concerns about inappropriate acquittals have resulted in extremely high thresholds for capacity-based exculpation (Mackay, 1995). High thresholds of this kind significantly limit the potential impact of neuroscientific evidence, especially where it relates to nuanced issues such as varying degrees of capacity (i.e. where capacity is impaired, but not undermined); and this has led to skepticism about the role of neuroscience in legal debates (Buckholtz & Faigman, 2014; Morse, 2013; Pardo & Patterson, 2013).

To a greater or lesser extent, those with a substance abuse disorder will experience impaired mental capacities, often exacerbated by associated states of intoxication. However, the high thresholds required for capacity-based defenses means that such defendants will rarely qualify for exculpation. Indeed, even where such thresholds are met, e.g. where a defendant's intoxication means they did not understand the circumstances of their actions, or were not acting voluntarily, special rules have developed within the courts to construct liability on the basis of the defendant's prior fault in choosing to voluntarily ingest drugs or alcohol (Jahangir, Child, & Crombag, 2017; Robinson, 2018). Critically, these prior fault rules do not apply to mental illness (including addiction) in the absence of acute intoxication (*DPP v. Beard*, 1920), but the thresholds for potential exculpation are unlikely to be met in these circumstances (i.e. where D is not intoxicated). As a result of these policy-focused rules, almost all cases involving a substance-using and/or addicted offender will cross the liability threshold and this is reflected in the extremely high representation of addicted offenders in the justice system (Belenko, Hiller, & Hamilton, 2013; Chandler, Fletcher, & Volkow, 2009). With little filter, such offenders pass to the sentencing stage.

At the sentencing stage, courts are tasked with balancing various aggravating and mitigating considerations in deciding upon a final sentence, guided by offense-specific sentencing ranges and overarching principles of criminal sentencing such as punishment,

rehabilitation, etc. It is at this stage that a more nuanced understanding of the brain effects of drugs and addiction may have the greatest impact upon legal decision making, with the either/or of the liability stage giving way to a graded approach across a sentencing range. Yet it is at the sentencing stage that least is known about the impact of (neuro)scientific understanding in judicial decision-making regarding drug-using and/or addicted offenders, and despite the prevalence of such offenders in the courts, there is a lack of clear direction within sentencing guidelines. Reflecting the norms of the liability stage, sentencing guidelines consistently characterize intoxication as aggravating and mental illness as mitigating (Sentencing Council, 2012). However, where an offender presents with a substance use disorder or addiction, potentially involving elements of both mental illness and intoxication (or, at least, historic intoxication), sentencing guidance is lacking.

A similar lack of clarity is apparent in other jurisdictions, including the US, where Federal Sentencing Guidance advises a denial of mitigation on grounds of future dangerousness (USSG, 2018, §5H1.4), but fails to engage with impact on culpability. As a result, some courts have explicitly considered evidence of drug-use and addiction as aggravating, even when introduced as a mitigating factor (Blume, Johnson, & Sundby, 2008; Freckelton, 1994), while others cite neurocognitive deficits associated with drug use and addiction as grounds for extending leniency. In *United States v. Hendrickson* (2014), for instance, the judge, citing neuroscientific evidence of addiction-related brain changes, noted “... because addiction is a serious brain disease that diminishes one’s capacity to evaluate decisions and regulate behavior, I consider addiction to be a generally and substantially mitigating factor” (p. 15; see also, *United States v. Lowry*, 2015; *United States v. Walker*, 2017).

The lack of adequate guidance and apparent inconsistency in the use of addiction-related evidence by courts risks inequity in criminal sentencing and begs empirical study into

sentencers' decision-making and reasoning in such cases. Where previous studies have engaged with the topic at all, they have done so in the context of the most serious and rarest of crimes, such as murder (Barnett, Brodsky, & Davis, 2004; Blume et al., 2008; Freckelton, 1994), rather than the 'run-of-the-mill' offenses which comprise the vast majority of cases seen by courts, and which constitute the greatest economic and social burden (Heeks et al., 2018). Moreover, to our knowledge, no studies have queried those actually tasked on a daily basis with sentencing addicted or drug-using criminal offenders.

In order to determine how addiction-related evidence is *de facto* considered in criminal sentencing, we conducted two separate studies among magistrates (aka 'Justices of the Peace') active or formerly active (retired) in the criminal courts of England and Wales (E&W). Virtually all criminal cases start in magistrates' court and, except for the more serious, 'indictable-only' offenses such as murder, lesser (summary or either-way) offenses - which constitute >95% of all cases - are typically tried in magistrates' court. At sentencing, magistrates (like higher court judges) follow relevant sentencing guidelines to form a judgment of the appropriate anchor-sentence based on the facts of the case, and then consider the wider circumstances of the crime for potential aggravating and mitigating factors and adjust the sentence accordingly. Our two studies were designed to follow a similar anchor-and-adjust procedure by using an online questionnaire asking magistrates to consider fictional case evidence in a staged manner in deciding punishment for a summary offense involving a defendant suffering from an addiction and/or from a fictional brain disease.

General Method

Ethics Approval

Ethics approval was granted by the University of Sussex's Sciences & Technology Cross-School Research Ethics Committee (C-REC) and all methods and procedures complied with British Psychological Society (BPS) guidelines. It was explained

to respondents at the start of the survey that all responses would be recorded anonymously and, as agreed in advance with the Magistrates' Association, except for age and gender in Study 2, no demographic information would be collected.

Participants

Respondents were magistrates active or formerly active (retired) in the courts in E&W, and all were members of the E&W Magistrates' Association. As explained on the association's website, magistrates are lay-judges drawn from the local community and, while they do not require formal legal qualifications, they have undertaken training including court and prison visits to develop the necessary skills to serve.

Magistrate respondents were recruited via a questionnaire link made available through the member's internal webpage of the Magistrates' Association website, which asked them to "participate in a study examining judgments of responsibility". Additionally, magistrates were invited to participate in Study 1 by distributing physical cards at London's Westminster, Hammersmith and Richmond courts or, in Study 2, via a notice published in the association's members' bulletin.

Materials and Procedures

With the assistance of the Magistrates' Association, current offense-specific sentencing guidelines, developed by the Sentencing Council for E&W (Sentencing Council, 2012), were used to establish the nature of the crime scenarios and the range of prison sentences (1-26 weeks) available, tailoring the facts (e.g. non-violent, lesser-harm and/or lower culpability acquisitive offences) to create scenarios typically seen and disposed of in magistrates court. Thus, while the basic offense scenarios/vignettes considered by respondents were fictional, the associated sentencing guidelines and recommended sentencing range were factual and those commonly used by (and therefore familiar to) criminal court magistrates in E&W.

We used online questionnaires asking respondents to indicate their sentencing decisions on the basis of case evidence introduced in a staged manner. As noted earlier, at sentencing, magistrates first assess the seriousness of the offence by estimating a defendant's culpability in committing the offence and the harm caused (or intended to cause). From this preliminary view of the appropriate anchor-sentence, magistrates must then consider potential aggravating and mitigating factors; these include factors integral to the offence (e.g. targeting a vulnerable victim, racial or religious motivations, offender drug or alcohol intoxication, etc.) as well as the wider circumstances and/or offender-specific factors, including the level of remorse and/or co-operation, youth/age of the offender, or mental illness or disability.

When reaching their decisions, in addition to considering future risk of reoffending (i.e. future dangerousness), magistrates are instructed that they must have regard to the 5 overarching aims or principles of sentencing as described in statute (Criminal Justice Act, 2003). These are: 1) The punishment of offenders; 2) reduction of crime including its reduction by deterrence; 3) reform and rehabilitation of offenders; 4) protection of the public; and 5) the making of reparation by offenders to persons affected by their offenses.

The case vignettes and other questionnaire materials were developed and administered using the Qualtrics software platform and hosted through their server (Qualtrics, Provo, UT). Upon clicking the link provided, respondents were presented with an introductory page containing a brief outline of what was to follow, together with information on their ability to withdraw from the survey. Once respondents clicked the "Continue" button, they were instructed that they would be presented with the details of a crime, and that it was their task to assign an appropriate sentence. It was further explained that, subsequent to the initial facts of the case, additional evidence would be introduced and that they would have the opportunity of modifying their initial anchor sentence decision in light of this new

information. No information was given about the number of evidence stages and adjustment opportunities that would follow the initial facts of the case.

Full details of the case evidence, guidelines and other instructions at the different experimental stages are available in Appendices A and B.

Data Analysis

Percentage sentence change. Sentencing decisions in weeks at the adjustment stage(s) were transformed into percentage change from the initial anchor sentence for statistical analyses. This process had the drawback that it could create outlying values in instances where participants chose to increase, rather than decrease, their sentence. That is, whereas the maximum possible percentage reduction a respondent could indicate was 96% (i.e. a reduction from 26 to 1 week), an increase in sentence could produce values considerably higher (up to 2500% if increased from 1 to 26 weeks). For this reason, in order to ensure that no undue weighting occurred in the analysis of percentage sentence change, it was *a priori* decided that increases greater than 300% at any of the adjustment stages would be excluded from the analyses. Critically, exclusion on this basis from analysis of percentage sentence change did not impact inclusion of a respondent's sentencing decisions in the analysis of frequency or odds of sentence change (see below).

Percentage sentence reduction data were checked for normality and heterogeneity of variance and, where assumptions were violated, non-parametric statistical approaches were used. Because in Study 2 the sample size/condition exceeded 30, Analysis of Variance (ANOVA) was conducted to allow comparison across all conditions, followed by non-parametric contrasts (Glass, Peckham, & Sanders, 1972; Lumley, Diehr, Emerson, & Chen, 2002).

Odds ratio calculations. Odds ratio (OR) analysis was conducted to examine the relationship between case evidence presented at the different stages and the relative

frequency of sentence reduction (versus non-reduction) by respondents as a function of experimental conditions. In this context, the OR represents the odds or likelihood that a magistrate would change their sentence after exposure to a particular set of case information, compared to the odds of sentence reduction occurring in the absence of such information, or in the presence of different information. Thus, the $OR = (a/b)/(c/d)$; where (a) and (b) are the number of sentence reducers and non-reducers, respectively, in experimental condition 1, and (c) and (d) the number of sentence reducers and non-reducers, respectively, in condition 2. An OR deviating from 1 in either direction is indicative of an association between the information provided at a particular stage and the likelihood of sentence change, and an OR of 1 is indicative of there being no association.

A drawback of this approach is that, in instances where respondents reduced their sentence to the minimum of 1 week at a particular stage, it became impossible for them to further reduce their sentence at the following stage (i.e. floor-effect), creating a confound (i.e. a non-reduction could indicate a genuine decision to not reduce or the impossibility of doing so). For this reason, responses subsequent to a reduction to 1 week were excluded from the OR analysis at the next stage. Critically, exclusion on this basis from the analyses of relative frequencies did not impact inclusion of respondent's sentencing decisions in the analysis of percentage change.

To determine whether the estimated ORs were statistically significant we calculated the 95% confidence intervals.

Bayesian analysis. In addition to our conventional (frequentist) statistical analyses, we applied a Bayesian approach. Bayesian analysis has several advantages; first, while standard null-hypothesis testing gives an indication of when it is reasonable to reject the null hypothesis, it does not allow us to determine when we should accept the null hypothesis. Bayesian analysis involves balancing the likelihood of two hypotheses given the results and,

as such, gives both the direction in which we should adjust our prior beliefs and quantifies (in the form of the magnitude of the Bayes Factor) the strength of the evidence in favor of or against doing so.

Second, conventional statistics and the p-values they produce lend themselves to error and/or misinterpretation. For instance, a test which results in a p value of .001 does not lend any more strength to a hypothesis than a p value of .04 (though it might commonly be interpreted as such). Nor does a p value of .06 (or greater) suggest that the tested hypothesis should be rejected. Bayesian analysis allows us to circumvent some of these erroneous intuitions by providing scope for symmetrical interpretation of likelihood.

Third and final, Bayesian analysis can be conducted in the absence of a decision procedure (a requirement of significance testing) and permits *ad hoc* hypothesis testing at the post-experimental stage.

Bayes factor (BF) calculations were performed using an online calculator, comparing our theory against a point null hypothesis of no effect in complement to the Fisherian approach initially adopted (Dienes, 2014, 2019). Prior probability distributions were modelled from previously observed results.

For Bayesian analyses conducted in terms of percentage sentence change, we employed a prior probability distribution modelled as a normal with a modal value and standard deviation derived from the observed results at preceding stages (Study 1) or, in Study 2, based on the results of Study 1. OR analyses employed the natural log of the calculated OR, while the predicted population value and associated standard deviation were derived from the observed effect at the previous stage (Study 1) or, in Study 2, based on the results of Study 1, modelled as a half-normal distribution. For BF calculations using estimates of pooled ORs, the standard error was calculated assuming a fixed-effects model.

A BF value greater than 3 indicates substantial evidence for the alternative over the null hypothesis and a BF value smaller than $1/3$ provides substantial evidence in favour of the null over the alternative hypothesis. BFs between 3 and $1/3$ indicate data insensitivity (Dienes, 2014; Jeffreys, 1939; Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011).

BFs are presented in the format $B_x(y, z)$, where x is the distribution employed, y is the modal value of the distribution and z is the standard deviation.

Power and effect-size calculations were performed using G*Power, version 3.1.3.

Study 1

Method

Participants. Of the 144 magistrate respondents recruited to take part, 34 did not complete any of the survey questions (i.e. no responses were indicated), and one respondent failed to indicate a response at one of the adjustment stages, leaving 109 complete surveys eligible for inclusion in the data analyses. On the basis of aforementioned exclusion criteria, one respondent (who increased their initial sentence by 500%) was excluded from the analysis of percentage sentence change, and eight respondents were excluded from the analyses of ORs at the first adjustment stage, and another three at the second adjustment stage. No significant differences were found in the time it took respondents to complete the survey ('time-on-task') as a function of experimental condition or response type at the different stages ($ps > .35$).

Materials and procedures. Magistrate respondents were presented with case evidence in a staged, sequential manner and were able to indicate at each stage their sentencing decision on a sliding scale ranging from 1 to 26 weeks imprisonment (in 1-week increments), matching the custodial sentencing range available in magistrates' courts when tried summarily. In order to decrease the likelihood of respondents simply clicking through

without considering the evidence, at each new adjustment stage the sentencing scale was reset to the minimum value of one week.

The initial ‘facts-of-the-case’ vignette was identical for all respondents and described the illegal entry of a pharmacy by a young defendant (D) named John, resulting in the theft of £100-worth of a prescription opioid drug. Witnessed exiting the pharmacy, D is soon arrested and arraigned in magistrates’ court. Based on these facts alone and the relevant sentencing guidance provided, magistrates were asked to assign an appropriate sentence. For complete case scenarios at this and subsequent adjustment stages see Appendix A.

At the first adjustment stage, magistrates heard testimony that D suffered from a neuropsychiatric condition characterized by reduced cellular gray-matter volume in his prefrontal cortex, associated with heightened impulsive behavior and reduced self-control. At this stage, magistrates were randomly assigned to one of two etiology conditions attributing D’s neurological and behavioral impairments to either a rare (fictional) disease, which we called ‘Woznicki’s disease’, or to his past chronic use of and addiction to heroin. After reading this new information, magistrates were again asked to indicate their sentencing decision.

At the second adjustment stage we introduced further case evidence concerning D’s earlier choices contributing to him acquiring his addiction or Woznicki’s disease, described as either autogenic (prior-fault choice) or iatrogenic (no choice) in nature, yielding a 2 (disease, addiction) x 2 (autogenic, iatrogenic) independent groups design. Thus, in the addiction-iatrogenic condition, magistrates heard testimony that D’s addiction had resulted from his doctor mismanaging his pain medication after an accident; conversely those in the addiction-autogenic condition learnt that D had chosen to start using heroin believing that it would ease his symptoms of depression. In parallel, magistrates assigned to the disease-iatrogenic condition were informed that D’s doctor overlooked the early signs of Woznicki’s

diagnosis, thereby putting him on a path to his present state of impairment; and finally those in the disease-autogenic condition learned that D had chosen to ignore his condition in the early stages when treatment would have prevented its progression (adding depression as the grounds for this choice).

A third adjustment stage was added across all conditions in which it was explained that D had stolen the prescription opioid from the pharmacy with the intention to self-medicate his neuropsychological symptoms. This stage was added to reinforce a causal nexus (self-medication of withdrawal or disease symptoms) between D's condition and his burglary offense.

At the fourth adjustment stage, all respondents were offered a final opportunity to reconsider their earlier sentencing decisions, either by adjusting the length of their earlier custodial sentences once more or opting to forgo prison altogether and offer D an opportunity to seek treatment in the form of a 12-week residential program. Thus, magistrates were asked if they were willing to alter their sentence to a community order and, if so, for how many months; those not willing to offer diversion to treatment were instead asked to make one final indication as to how long his custodial sentence should be.

After completing the survey, a final page was presented containing a debriefing statement outlining the purpose of the study and the fictional nature of Woznicki's disease, and further clarifying that neuroscientific research suggests that the neurological impairments described in the vignettes can be associated with chronic (addictive) heroin use.

Results

On the initial facts of the case, magistrates' anchor-sentences varied along the full range available, with the minimum of 1 week ($n=8$) and maximum of 26 ($n=1$), but skewed towards the lower two-thirds to distribute around an average sentence of 9.1 weeks

imprisonment ($SD = 4.8$). Seventy-four respondents' custodial sentences (67.9%) fell within one standard deviation of the mean.

On reading further evidence of D's neuropsychiatric symptoms at the first adjustment stage, the two etiology conditions resulted in a marked difference in sentencing judgements; in the disease condition, magistrates reduced their initial anchor sentence by an average of 17.1% (or 1.6 weeks) compared with only 7.1% (or 0.5 weeks) on the part of those in the addiction condition, Mann-Whitney $U=1075.5$, $z=-2.79$, $p=.005$ (two-tailed test), $r=0.48$, power=0.68. This difference was principally driven by *whether* magistrates chose to reduce their initial sentence (Figure 1A); with 49% of magistrates ($n=24$) reducing their initial sentence in the disease condition and only 23% ($n=12$) in the addiction condition (Figure 1A, left panel), D's odds of receiving a more lenient sentence dropped by more than 3 times if his testimony mentioned heroin addiction as the cause of his neuropsychiatric symptoms, $OR=3.2$, $95\%CI=1.4-7.5$, $\chi^2=7.4$, $p=.007$ (see Figure 2). However, those magistrates who did decide to reduce their sentence after learning of D's neuropsychiatric symptoms did so by roughly the same percentage amount in both etiology conditions, $U=123.5$, $z=-.69$, $p=.50$ (Figure 1A, right panel).

- Figure 1 approximately here -

Upon learning that D's symptoms were the result of either his own past decisions (autogenic/choice groups) or his doctor's medical diagnostic or treatment error (iatrogenic/no-choice groups), and that D's offense was 'motivated' by his wish to self-medicate his disease or addiction (withdrawal) symptoms, respondents differentially altered their earlier (adjustment stage 1) sentences. Of these, 23 participants (48%) in the iatrogenic/no-choice (addiction or disease) conditions ($n=53$) decreased their previous sentence on being informed that D's disorder originated from an error on the part of his physician, compared with 5 participants (11%) in the autogenic/choice (addiction or disease)

condition ($n=50$) who were informed that D's disorder stemmed from his earlier decisions to forgo treatment, $U=952.0$, $z=-3.3$, $p=.001$ (two-tailed test), $r=0.61$, power=.85.

Within the addiction condition, evidence that D's addiction was in part attributable to his past decisions (autogenic versus iatrogenic), and that his burglary offense was motivated by a need to self-medicate, had a large effect on magistrates' sentencing decisions.

Specifically, the percentage reduction in sentence in the iatrogenic/no-choice condition was significantly greater than that in the autogenic/choice condition, $U=203$, $z=-2.57$, $p=.01$ (two-tailed test; Figure 1C). Furthermore, on hearing evidence that not D, but rather his doctor, bore responsibility for initiating his heroin use and ultimately his addiction (iatrogenic), magistrates were 12 times more likely to reduce his sentence compared to addiction that was seemingly self-generated (autogenic), $OR=12.0$, 9% $CI=1.4-105.4$, $\chi^2=7.0$, $p=.008$, $B_{H(0,1.16)}=5.0$ (Figure 1B and 2); these odds improved even further when self-medication of his withdrawal symptoms was added as a motive for the offense, $OR=20.3$, 95% $CI=2.4-175.3$, $\chi^2=11.6$, $p=.001$, $B_{H(0,1.16)}=9.7$.

In parallel, in the disease conditions, evidence that D's earlier decisions did not contribute to his symptoms developing or worsening (iatrogenic/no-choice condition) resulted in significantly greater sentence reduction than that in the autogenic/choice condition, $U=176$, $z=-1.98$, $p=.05$ (two-tailed test; Figure 1C), as well as increasing his odds by more than 3 times of receiving a further sentence reduction (compared to the parallel iatrogenic-disease condition), $OR=3.4$, 95% $CI=0.8-14.9$, $\chi^2=2.8$, $p=.10$, $B_{H(0,1.16)}=2.5$ (Figure 2), and still further when D's offense was motivated by self-medication, $OR=4.0$, 95% $CI=1.0-15.5$, $\chi^2=4.2$, $p=.04$, $B_{H(0,1.16)}=4.4$.

When considered across the two etiologies, a Cochran-Mantel-Haenszel estimate of the pooled ORs revealed a more than sevenfold greater likelihood of sentence reduction in

the iatrogenic/no-choice conditions when contrasted with the autogenic/choice groups, $OR=7.2$, $95\% CI=2.3-22.7$, $\chi^2=12.7$, $p<.001$, $B_{H(1,1.16)}=87.0$ (Figure 2).

Combined over the first 3 adjustment stages, the mean percentage reduction in sentence by magistrates (Figure 1C) was significantly greater in the disease conditions than in the addiction conditions, $U=1090.5$, $z=-1.72$, $p=.04$ (one-tailed test), $r=0.30$, $power=.44$.

Within the disease conditions, sentence reduction was significantly greater in the iatrogenic/no-choice group than in the autogenic/choice group, $U=170$, $z=-2.59$, $p=.004$ (one-tailed test), $r=0.65$, $power=.57$. Similarly, within the addiction conditions, mean sentence reduction in the iatrogenic group was significantly greater than in the autogenic group, $U=256$, $z=-2.46$, $p=.007$ (one-tailed test), $r=0.56$, $power=.70$.

- Fig 2 approximately here -

Finally, when magistrates were given the opportunity to divert D's punishment from a custodial sentence to a community order, on the understanding that D would commit to a treatment program, all respondents did so, indicating an average length of community order of 12.4 months ($SD = 4.5$).

In summary, the results from Study 1 suggest that perceived initial choice in the acquisition of drug-using habits (leading to addiction) is a pivotal factor distinguishing addiction from other diseases of the mind/brain in the consideration of magistrates in E&W; removing choice from the addiction narrative increased the probability of leniency to 60%, in line with that of a disease (70%), and, critically, well beyond the 16% afforded to a 'typical' addict (Figure 1B). Conversely, when we added choice to a disease, we made it more analogous to addiction, reducing the likelihood of sentence reduction or in some cases reversing leniency extended at the earlier stage. When considered as a whole and in real terms, despite identical case facts and neuropsychiatric symptoms, varying the historical nature of their acquisition resulted in marked differences in final custodial sentence. At the

extreme ends, addiction involving choice in acquisition resulted in an average of 9.1 weeks imprisonment (i.e. equal to the initial anchor sentence), and disease not involving choice in 5.5 weeks imprisonment (Figure 1D), an almost 40% difference in outcome.

Study 2

Drawing on the impression from Study 1 that the initial choice in taking drugs is a pivotal factor in assessing the extent of blameworthiness for a criminal offence, it would follow that the circumstances surrounding that initial choice would be relevant to magistrates' sentencing decisions. On this basis, and beyond seeking to replicate the results of Study 1 using a between-subjects design, Study 2 was conducted with the following aims:

First, to explore the relevance of D's age when making the initial choice to take drugs. If, as the evidence suggests, a majority of addicts initiate drug use while still a juvenile (Bracken, Rodolico, & Hill, 2013; Compton, Dawson, Conway, Brodsky, & Grant, 2013), then the choice which underlies it is made at a developmental stage where the justice system usually adopts more lenient punishment practices. This reflects a long-held understanding by courts and legislatures - and one increasingly influenced by neuroscientific evidence of brain development (Steinberg, 2013) - that, compared with adults, adolescents are more impulsive and sensation seeking, less likely to consider the consequences of their actions, more susceptible to coercive (peer) pressure and, as a consequence, less blameworthy. Except in the case of very serious offenses, juvenile offenders aged between 10 and 17 are typically transferred to specialized juvenile or youth courts where sentencing decisions emphasize prevention and rehabilitation rather than retributive, punishment principles. In Study 2 then, we examined whether Magistrates might adopt a similar logic and approach when considering the blameworthy nature of past decisions to take drugs (i.e. prior-fault choices) that preceded addiction.

Second, we wanted to understand the potential impact of mixed choices/etiology. If, as our Study 1 results suggest, the critical difference between addiction and disease lies in the implicit understanding that prototypical diseases are acquired without fault, we predicted that drug use and addiction preceded and caused by a disease would garner greater sympathy. In fact, as well as providing a useful model to test the absence of choice interpretation, the notion that disease states often precede and coincide with the use of and/or addiction to drugs of abuse has ecological validity, given the comorbidity of drug use disorders and other mental illnesses (Compton et al., 2013; Grant et al., 2008). To this end, in addition to replicating the addiction and disease (alone) conditions from Study 1, Study 2 included two new conditions in which (i) fictional Woznicki's disease led to the use of and addiction to heroin, and (ii) addiction to heroin led to the development of Woznicki's disease. In both conditions it was emphasized that the mental impairment upon which mitigation was predicated was attributable to the most recent factor in the chronology.

Finally, we wanted to further and more directly probe magistrates' reasoning in reaching their sentencing decisions. To this end, we asked them to indicate their estimates of the likelihood of D re-offending (i.e. future dangerousness) as well as to rank in order of importance the five principles of sentencing described in the Criminal Justice Act 2003 when making their decisions. Additionally, we queried magistrates' explicit beliefs in relation to addiction, choice and punishment, by presenting them with a brief series of statements.

Method

Participants. For the second study, 290 active or retired ($N=22$) magistrates were invited to participate. Of these, 14 did not complete any of the survey questions, leaving 276 submitted responses eligible for inclusion in the analyses.

Based on aforementioned exclusion criteria, six respondents (who increased their sentence by an average of 1600%, $SD=874\%$) were excluded from the analyses of percentage

sentence reduction, and seven respondents who indicated an initial anchor sentence of 1 week from the analysis of ORs.

No significant differences were found in ‘time-on-task’ as a function of experimental condition or response type ($ps > .25$).

Materials and procedures. Study 2 used a between-subjects design and a single adjustment stage to test magistrates’ sentencing decisions of a defendant (D) for aggravated theft as a function of (i) defendant’s addiction and/or disease-related brain damage, and (ii) age of onset (15 versus 20 years). Using identical procedures as before, at the initial facts-of-the-case stage all respondents read a brief vignette setting out a fictional scenario of a summary offence, this time involving a defendant named David found guilty of the non-violent theft of £1000 from an elderly victim. Magistrates were asked to consider the facts of the case, including that the crime involved a vulnerable (elderly) victim and caused long-term emotional harm, and to indicate their anchor sentence between 1 and 26 weeks. For complete case scenarios at this and subsequent stages see Appendix B.

Having indicated their anchor sentence, at the adjustment stage respondents were again presented with evidence that D suffered from damage to his prefrontal cortex resulting in impulsive behavior and a lack of self-control, and that his neuropsychiatric profile contributed to his commission of the crime. At this stage, respondents were randomly assigned to one of eight conditions using a 2 x 4 between-subjects design. The first factor was age of first drug use or onset of Woznicki’s-related neurological symptoms with two levels, either 15 or 20 years old. The second factor was etiology with four levels, of which two replicated the addiction and disease conditions from Study 1, and two were mixed etiology narratives: one in which heroin use and addiction had resulted in the development of Woznicki’s disease, and the second in which Woznicki’s disease led to initiation of heroin use and addiction. Thus, there were four etiology conditions: addiction-alone; disease-alone;

addiction-disease; disease-addiction. Upon reading this information, magistrates were given the opportunity to adjust their anchor sentence.

Once respondents had chosen to increase, decrease or leave unchanged their original sentence, they were presented with the five aforementioned general principles of sentencing (Punishment, Reduction, Rehabilitation, Protection, Reparation) and asked to select those which were at the forefront of their consideration in making their determination. If more than one principle was selected, participants were asked to rank these in order of relevance to their deliberation. All respondents were then asked to indicate on a sliding, visual analogue scale (VAS), ranging from “*Not at all likely*” to “*Extremely likely*”, how likely they thought it was that D would go on to commit further crimes in the future.

As in Study 1, all respondents were then given the option of suspending D’s custodial sentence in favor of a community order, with a view to facilitating his attending a residential treatment facility. Those who chose to suspend his sentence were asked to indicate for how long they felt his suspended sentence should last, on a sliding scale between 1 and 24 months.

Finally, in order to assess magistrates’ explicit beliefs in relation to addiction, choice and punishment, we presented them with the following statements: 1) “Addiction is a disease”; 2) Drug addiction is evidence of a lack of moral character”; 3) “Addicts must at one time have chosen to start taking drugs”; and 4) “People punished for taking drugs are less likely to take them in the future”. Magistrates were able to indicate their level of agreement with each statement using a 7-point Likert scale ranging from “Strongly disagree” to “Strongly agree”.

After completing the survey, respondents were debriefed as in Study 1.

Data analysis. In addition to the analyses already described, analysis of the principles of sentencing responses was conducted on citation frequency and ranking; only 4% of respondents ($n=12$) stated that only one of the five principles was at the forefront of their

consideration when making their decision (6 cited only Punishment, 4 Protection and 2 Rehabilitation). The remaining 96% of respondents ($n=264$) offered two or more principles and were subsequently asked to rank them in order of relevance. Rankings were then converted into weighted scores, calculated as the reverse of ranked importance (1st place=5 points, 2nd place=4 points, 3rd place=3 points, etc.). Where three or fewer principles were selected, those omitted shared the points available for the remaining positions. For example, if three principles were selected and ranked in 1st, 2nd and 3rd position, those principles which had not been selected would occupy the 4th and 5th ranks, receiving 1.5 points each.

Results

In line with national figures, our sample was close to evenly divided between males ($n=131$) and females ($n=145$), and the majority (60.2%) were between 61 and 70 years of age.

At the anchor sentencing stage, magistrates again used the full range of sentences available to them, this time averaging around a higher sentence of 18.1 weeks ($SD=6.6$, $N=276$), reflecting the more severe offence characteristics (vulnerable victim and greater harm) of the case under consideration. The minimum sentence indicated was 1 week ($n=7$) and the maximum 26 ($n=61$), with 180 responses (65.21%) falling within 1 SD of the mean.

Analysis of Variance (ANOVA) indicated a significant main effect of etiology on percentage sentence reduction, $F(3,262)=11.9$, $p<.001$, but no main effect of age, $F(1,262)=0.02$, $p=.90$, or age by etiology interaction effect, $F(3,262)=0.82$, $p=.49$ (see Figure 3A). Likewise, Mann-Whitney U tests failed to reveal any effect of age on percentage sentence reduction by magistrates (Table C1 in Appendix C).

To further examine the impact of age of initiation of drug use (or of onset of disease symptomatology) on magistrates' sentencing decisions, both the relative frequency and odds of sentence reduction were analyzed across etiology conditions. Although there was a slight

tendency towards more frequent sentence reductions in the age 15 variants of each etiology condition (Figure 3B), in no instance did this reach significance. Moreover, OR Bayes Factors fell within the range of 0.51 to 1.43 (Table C2 in Appendix C) indicating that the data were insensitive, and no conclusion could be drawn about the impact of age on the likelihood of sentence reduction across any of the etiology conditions. Finally, there were no significant effects of age on the length of custodial sentences imposed at the final instance (Table C3 in Appendix C). Because all three analyses failed to provide evidence that age impacted magistrates' sentencing decisions, the data were collapsed across this factor to further analyze for effects of etiology conditions alone.

- Fig 3 approximately here -

An overall comparison of the effects of etiology on the percentage sentence reduction by magistrates resulted in a significant effect, Kruskal-Wallis $H(3)=34.6, p<.001$ (Figure 3C). *Post hoc* comparisons using Holm-Bonferroni-corrected Mann-Whitney tests showed that this overall effect was attributable to two broad consequences of the etiology condition to which magistrates were assigned: First, those in the addiction-alone condition were least willing to reduce their initial anchor sentence compared to all three other etiology conditions, $U_s>1055, p_s<.01$. Second, and conversely, magistrates assigned to the disease-alone condition indicated the highest percentage sentence reductions, significantly different from the addiction-alone condition, and either of the mixed addiction and disease etiologies, $U_s>1604, p_s<.05$. Surprisingly, sentence reductions in the mixed etiologies occupied a middle position between the addiction- or disease-alone conditions, and magistrates assigned to the two mixed etiologies did not significantly differ in their sentencing decisions, $U=2108, z=-0.64, p=.52$ (two-tailed test), $r=0.06$, power=.06, $B_{N(11.6, 5.8)}=0.2$.

As we found in Study 1, the differences in percentage sentence change by magistrates were in large part (but not entirely) the result of differences in the number of magistrates willing to reduce their sentence (Table 1).

- Table 1 approximately here -

When D's neurological impairment stemmed from Woznicki's disease alone, respondents were more than 7 times as likely to reduce the custodial sentence than when resulting from addiction alone, $OR=7.7$, $\chi^2=30.2$, $95\%CI=3.6-16.6$, $p<.001$, $B_{H(0,1.16)}=1.6 \times 10^5$, replicating the results in Study 1. However, on this occasion those magistrates who decided to reduce also did so to a greater extent, with 50 magistrates in the disease condition reducing by an average 40.4% ($Mdn=33.3$) and 19 magistrates in the addiction condition by an average 28.6% ($Mdn=25.0$), $U=324.0$, $z=-2.04$, $p=.04$ (two-tailed test), $r=0.68$, $power=.68$.

Magistrates in the addiction-alone condition were also around 3 times less likely to reduce their initial sentence compared to the mixed disease-addiction, $OR=2.9$, $\chi^2=8.7$, $95\%CI=1.4-6.0$, $p=.003$, $B_{H(0,1.16)}=21.3$ or the addiction-disease conditions, $OR=3.6$, $\chi^2=12.5$, $95\%CI=1.7-7.6$, $p<.001$, $B_{H(0,1.16)}=83.1$.

Finally, the odds of receiving a sentence reduction in the disease-alone condition more than doubled those of the addiction-disease condition, $OR=2.2$, $\chi^2=4.3$, $95\%CI=1.0-4.5$, $p=.04$, $B_{H(0,1.16)}=4.1$, or disease-addiction condition, $OR=2.7$, $\chi^2=7.2$, $95\%CI=1.3-5.6$, $p=.007$, $B_{H(0,1.16)}=15.0$, with no observed difference in the odds of sentence reduction between these mixed conditions, $OR=0.8$, $\chi^2=0.4$, $95\%CI=0.4-1.6$, $p=.54$, $B_{H(0,1.16)}=0.19$ (Table 1).

In sum, and in line with our findings from Study 1, sentence reductions were much more likely to be seen in the disease condition than in the addiction condition; while the mixed etiologies in which addiction led to disease or *vice versa* produced 'middle-ground'

sentencing between the two extremes. The result of these differences in actual weeks in prison are shown in Figure 3D.

Sentencing principles and future dangerousness. When asked to indicate which of the sentencing principles were most important in reaching their decision, magistrates most frequently cited Protection of the Public (89.1%), followed by Punishment (85.5%), Reduction (65.5%), Rehabilitation (51.1%), and lastly Reparation (35.5%). Analysis of the rankings provided by magistrates who indicated that two or more principles were important produced the same overall hierarchy with punishment and protection as most important, and rehabilitation and reparation as least (Figure 4A).

Citation frequencies revealed significant associations between etiology and the frequency with which magistrates cited ‘punishment’ and ‘rehabilitation’ as important principles guiding their sentencing decisions, but not in the case of the other three principles (Figure 4A). Specifically, respondents in the addiction alone condition cited rehabilitation much less frequently compared to respondents in the other three conditions in which disease was mentioned in some form, whether alone or as part of a mixed etiology narrative, $\chi^2=10.8, p=.01$ (Figure 4A). In other words, the absence of any mention of disease appeared to make rehabilitation less relevant as a principle in magistrates’ sentencing decisions. Conversely, attributing D’s impairments to Woznicki’s disease alone, excluding addiction from consideration, significantly reduced the frequency with which punishment was cited as a factor, $\chi^2=10.3, p=.02$ (Figure 4B).

- Fig 4 approximately here –

Magistrates’ estimates of future reoffending/dangerousness did not vary significantly with etiology (and/or age), with respondents across all conditions offering an average estimate of in the region of 60-70% (Table C4 in Appendix C). However, Pearson product-moment correlation coefficients revealed that length of final sentence was positively

correlated with estimated probability of reoffending, $r=0.347$, $p<.001$. Additionally, amongst those willing to see the custodial sentence suspended in favor of a community order ($n=232$), there was a small but significant positive correlation between the length of that community order and estimated probability of reoffending, $r=0.189$, $p=.004$. Amongst those who chose not to suspend the custodial sentence ($n=43$), a greater positive correlation was observed between the length of final sentence and estimated probability of reoffending, $r=0.534$, $p<.001$.

Explicit opinions. Analysis of magistrates' responses to the 4 statements yielded the following main findings: First, the majority (76%) agreed with the statement that 'Addiction is a disease' and those that did were also four times as likely to disagree that 'Drug addiction is evidence of a lack of moral character', $OR=4.1$, $\chi^2=14.8$, $95\%CI=1.93-8.89$, $p<.001$. 11% of respondents agreed with both statements. Leaving aside respondents who indicated a neutral response to the addiction=disease statement (12%), of the small number of magistrates that disagreed (12%), 39% also disagreed that addiction indicates moral failing, 24% were neutral on the issue, and only 4% ($n=12$) agreed that addiction is a moral failure.

Second, the majority of magistrates (71%) also agreed with the statement that 'All addicts must at one time have chosen to start taking drugs', contrasted with only 19% who disagreed. When considered in relation to the addiction=disease view, 69% of respondents agreed with both statements that addiction is a disease and that it involved choosing at some time to start taking drugs. Indeed, acceptance or rejection of the disease model of addiction did not appear to depend on whether initial drug use was understood to be choice, $OR=1.3$, $\chi^2=0.3$, $95\%CI=0.5-3.3$, $p=.57$.

Third, to the statement whether 'people punished for taking drugs are less likely to take them in future', a full 77% of respondents disagreed with this statement, with nearly half

doing so in the strongest possible terms. Only 12% of our respondents agreed with the statement, and not a single one indicated strong agreement.

Discussion

Our studies explore whether and how magistrates active or formerly active in the courts of E&W consider neurobiological and behavioral evidence of addiction versus disease in deciding blameworthiness and punishment, and their reasoning behind such decisions. First, foremost, and replicated across the two studies, what is clear is that magistrates do not agree with a simplistic view that addiction and disease should be treated synonymously, even when described as having identical neuropsychological symptomatology. Second, by varying conditions in relation to choice in initiating drug use, the data are able to explain magistrates' resistance to the 'addiction=brain disease' view, not as a rejection of its neuroscientific credibility, but as an outcome of perceived choice and culpability in acquiring symptoms; any explicit evidence of choice versus no-choice (described as autogenic versus iatrogenic, respectively), or understanding that drug-use and addiction were preceded and caused by a disease (or *vice versa*), altered judgements of blameworthiness at sentencing. Surprisingly, these differences were seen independent of the age at which this choice occurred, and of magistrates' estimates of the likelihood of re-offending. Finally, magistrates' decisions reflected, in part, a balancing between principles of sentencing: any evidence of heroin-use and addiction was more likely to evoke retributive punishment considerations, and less likely to evoke rehabilitation considerations.

We should be upfront and clear that it was not the aim of our studies to engage with the normative question of whether addiction *should or should not* be considered relevant for deciding questions of criminal responsibility and blame (whether at the liability or the sentencing stage). Nor was it our aim to argue that the current state of neuroscientific understanding of addicts' brains, and how certain drugs, in certain individuals, under certain

circumstances, interfere with ‘normal’ brain structure and function, offers a credible route to exculpation under the current legal rules. Rather, our aim was to empirically test whether and how, within the existing legal and scientific context, addiction is *de facto* treated at sentencing by those actually tasked with making such decisions on a daily basis.

At first sight, the different treatment of our defendants presented as a heroin addict or suffering from a fictional disease, despite identical symptomatology, appears to evidence magistrates’ rejection of the addiction as a brain disease narrative; a narrative that permeates a growing number of debates, including those around the stigmatization of addicts (Hall, Carter, & Forlini, 2015), the ethics of using non-human animals in addiction research (“Animal farm: Nature News & Comment”, 2014), the right to voluntary euthanasia (Ashcroft, 2018) and, as we explore here, whether or how to hold addicted offenders to account for their misdeeds. As described by the National Institute on Drug Abuse (NIDA/NIH), “[addiction] is considered a brain disease *because* drugs change the brain - they change its structure and how it works” (*Drugs, brains, and behavior: The science of addiction*, 2007 p.5, emphasis added). This narrative of pathological structural and functional brain changes is not without its critics, including neuroscientists and philosophers who question the persistence and/or deterministic nature of the supposed brain changes (e.g. Heyman, 2010; Lewis, 2017; Satel & Lilienfeld, 2014), and law experts who challenge the whole notion that evidence of brain dysfunction (whatever its nature) has unique relevance for the criminal law (Morse, 2013). If, in like fashion, our magistrates simply rejected this disease narrative, this might explain our results.

However, this simplistic explanation does not tell the whole story. Further layers within the studies reveal something more complex, but also more interesting, in the rationale of magistrates: addiction *is* accepted as a brain disease, but it is denied the mitigating effect of a disease due to the perception of prior-fault in its initiation. Prior-fault in the initiation of

addiction or Woznicki's disease emerged as the principal and most consistent measure of likely blame at sentencing, impacting the odds of sentence reduction and the relative weighting of the principles of punishment and rehabilitation. Addiction may be a disease, but because it is brought about by prior-fault choices to use drugs, it doesn't seem to matter.

It is worth revisiting then what one Director of the National Institute on Drug Abuse (NIDA), Dr Alan Leshner, famously noted, that "... even if [addiction] initially comes about because of a voluntary behavior (drug use), an addict's brain is different from a non-addict's brain, and the addicted individual must be dealt with as if he or she is in a different brain state" (Leshner, 1997, p. 49). Our results indicate that the degree to which addicts are held criminally responsible for their actions at sentencing may in fact not depend on the scientific and legal credibility of their current state of addiction and its pathological 'disease-like' nature, but instead on Leshner's caveat that addiction "initially comes about because of a voluntary behavior".

Magistrates' beliefs about addicted offenders, implicit from their sentencing decisions, were also made explicit in the answers to our follow-up questions at the end of Study 2. A substantial majority of magistrates (76%) agreed with the statement that 'addiction is a disease' and, of those, 73% disagreed with the statement that 'addiction is evidence of a lack of moral character'. At the same time, a comparable majority (71%) recognized that addicts 'must at some time have chosen to start taking drugs'. It appears then that, also explicitly, most magistrates see addiction as a brain disease, but a brain disease that involved prior choices and presumably, therefore, a basis for assigning (or at least, not withholding) blame and punishment. That does not mean that magistrates also believed that such punishment would be particularly beneficial from a drug rehabilitation perspective; when asked, the overwhelming majority (77%) indicated they did not believe punishment would reduce subsequent drug use. Perhaps this reflects magistrates' understanding that in many prisons in

E&W psychoactive drugs of various sorts are readily available (HM Prison and Probation Service, 2019), making them precarious environments for drug-involved offenders to find themselves. This may also explain why, across our two studies, magistrates given the opportunity to divert from custody in favor of treatment most commonly did so.

By revealing the central role played by prior-choice, our studies highlight at least three potential issues of legal significance. The first is clarification that, despite an absence of sentencing guidance on addiction in E&W, mitigation is generally being denied for this class of offenders. At first impression, this finding may seem uncontroversial: magistrates are likely to have associated addiction with voluntary drug use (at least historic use), and we know that intoxication is capable of establishing fault at the liability stage and aggravates at sentencing. Other common law jurisdictions, such as the US (USSG, 2018, §5H1.4), have even codified a denial of mitigation for addicted offenders within their sentencing guidelines. However, it is important to acknowledge the inconsistency this creates within the law as well. To treat a current state of addiction as equivalent to a current state of intoxication at sentencing, implicitly (E&W) or explicitly (US), is to break with a century of jurisprudence about their difference in culpability at the liability stage. As famously observed by Lord Birkenhead in *DPP v. Beard* (1920), “a man who by his own voluntary act debauches and destroys his will power shall be no better situated in regard to criminal acts than a sober man”, but, “drunkenness is one thing and the diseases to which drunkenness leads are different things, and if a man by drunkenness brings on a state of disease which causes such a degree of madness even for a time, [...] he would not be criminally responsible” (p. 501). The distinction here, between intoxication and addiction at the liability stage, has endured because of the greater normative difficulty in tracing criminal blame back to past voluntary conduct months or even years preceding a criminal event. Breaking from this at sentencing should

raise critical questions when done explicitly, as in the US, and even more so when done implicitly (but inconsistently) as our studies find in E&W.

Second and related, magistrates' application of a similar prior-fault logic to Woznicki's disease, denying the mitigating effect of a disease within the autogenic/choice condition, is even more surprising. This is because mental disease in the absence of intoxication currently entails no prior-fault inculpatory doctrine at the liability stage (i.e. such doctrines are *not* applicable), and the only relevant provision within the sentencing guidelines highlights "mental disorder" as mitigating. This is also true of other jurisdictions, such as the US, where sentencing provisions on mental and emotional conditions do not engage with questions of causal blame (USSG, 2018, §5H1.3). As such, our magistrates' more expansive use of prior-fault logic at sentencing to include prior-fault choices at the initiation of a brain disease runs counter to standard criminal law principles. This is not to say that this is normatively faulty, and it may be consistent with the perception of addiction as a disease like any other, but it is a shift without clear control or rationalization.

The third important issue relates to a defendant's age when inculpatory choices are made. Varying the age of initiation between 15 and 20, our studies found no significant effects on sentencing. Where first drug use takes place at 15 years of age, interesting questions arise about the voluntary nature of that use. The immaturity of the PFC during adolescent development is generally recognized by academics and courts alike as lessening criminal responsibility in the case of juvenile offenders, with the associated impulsivity and lack of the 'normal' restraining powers of adulthood being commonly understood as strong bases on which to withhold prosecution or moderate sentencing (Steinberg, 2013). If the legal view of adolescent choices is one which suggests reduced culpability for their consequences, then similar reasoning should maintain in the event of addiction as one such consequence. The point here is that although magistrates appear to apply a prior-fault logic in assessing

choices that lead to addiction and mental disease, such logic is applied without sensitivity to factors that should perhaps mitigate the blame attached to that choice. Our results signal the need for further research on this issue, and we discuss this in the Limitations and Future Directions section below.

A similar lack of nuance was evident in the mixed etiology cases, where results showed a simple middle-grounding of sentencing. These conditions explored important, and real-world relevant, distinctions between types of prior-fault choice. Our disease leading to addiction scenario is particularly relevant against the background of the well-publicized opioid abuse and overdose crisis ongoing in the US and emerging within the UK, which is understood in large part to be instigated by the over-prescription of opioid analgesic drugs (for therapeutic reasons), and then escalating into illicit and addictive use of opioid drugs such as heroin (Volkow, Jones, Einstein, & Wargo, 2019). The mitigating force of this narrative can be seen in a recent US case, in which the sentencing judge significantly reduced the sentence for FBI agent Matthew Lowry for offenses including possession of heroin stolen from evidence, citing Lowry's serious medical ailment and need for opioid analgesics as (part of) the reason for a downward departure.

This should be contrasted with our addiction leading to disease condition, which on the substance of symptomatology equaled the addiction-alone condition, except for attaching a (fictional) disease-name to the symptoms. And yet this condition was also middle-grounded in sentencing between addiction alone and our fictional disease. That the 'addiction leading to disease' condition and 'addiction alone' condition resulted in significantly different outcomes suggests that, at least within the context of the law, the extent to which addiction is considered a brain disease properly so-called depends in part (but not entirely) on properly calling it so.

Our results demonstrate the apparent willingness of magistrates to accept and to act on neurobiological evidence when making sentencing decisions, including the treatment of addiction as a brain disease. However, the data also suggest that if addiction science looks to impact criminal law and wider public policy, it may be better served by refocusing some effort away from the neurocognitive sequelae of chronic drug use, towards neurodevelopmental and environmental factors that determine initial use. In view of magistrates' limited engagement with complexities around prior-fault choices (i.e. age and mixed etiologies), such scientific understanding may provide a more convincing basis for legal reform, including the development of new guidelines to rationalize and direct sentencing decisions in the future.

Limitations and Future Directions

Our studies offer new empirical insights into court magistrate's reasoning and criminal sentencing in cases involving addiction and/or mental disease, but there are some limitations to consider. In relation to experimental design and procedures: Our studies used questionnaires presenting magistrates with precisely tailored and relatively simplified (fictional) case evidence in a staged manner, tailored to approximate courts' anchor-and-adjust sentencing procedures and force respondents to selectively engage with relevant variables in relation to etiology, prior-fault choice, and age, while controlling for others to optimize reliability and internal validity. The trade-off for this approach is that it may have resulted in the task appearing somewhat contrived, forcing a degree of sequential staging (at least in Study 1) less commonly experienced by court magistrates, and which, insofar as anticipated by respondents, could have compelled them into more conservative sentencing decisions at earlier stages to allow for subsequent adjustments (though no prior information was given as to the number of adjustment opportunities ahead). Equally, in testing magistrates individual sentencing decisions, we divorced them from the 'real world' setting

which would involve a dialogue with 1 or 2 other magistrates, assisted on matters of legal rules and procedure by a legally-trained court Clerk.

On this point then it is worth considering the potential impact that court deliberations might have on individual decision making, and a rich social psychological literature exists on this topic of which discussion here would be well beyond the scope of our paper (e.g., Hastie, Penrod, & Pennington, 2014; Klein & Mitchell, 2010). However, it will be clear that, with judges and jurors bringing individual knowledge, life-experiences, attitudes, decision strategies and biases, etc. to court deliberations, real-life sentencing decisions involving 2-3 magistrates creates a more dynamic and complex decision environment than was modeled in our experiments. Our findings therefore speak more to what those individual contributions to real-life sentencing deliberations might include, and less to how any group dynamics during deliberations might in turn impact individual sentencing decisions.

Moreover, by using a fictional disease (which we named Woznicki's) we were able to control for potential biases regarding well-known diseases, but it is conceivable (though perhaps not likely) that some respondents 'caught on'. Future studies aimed at testing the external validity of our findings in real-world settings, e.g. through examination of sentencing reports and/or interviews with magistrates or judges, will therefore be important.

A strength of our studies is that we were able to sample court magistrates either active or formerly active in the courts of E&W. However, as per agreement with the Magistrates Association, only limited demographic information was gathered in Study 2 (and none in Study 1). Although we can say that, on the basis of gender and age, Study 2's sample (recruited with similar methods as Study 1) was broadly in line with national figures, and in these respects representative of the wider population, we were not able to conduct more fine-grained analyses of our results in relation to factors such as geographic location and prior experience with addiction and/or mental disorders. In this context we note that our sample

was obtained by magistrates voluntarily choosing to partake via a weblink on the Magistrates' Association website, accessible to all magistrates (active or retired) in E&W (estimated to be around 16,000). It is conceivable then that our two study samples skewed towards certain magistrate demographics, e.g. in more urban settings (and therefore perhaps with greater experience of drug addiction), more experienced with computers and/or being online, etc., which may have somewhat limited the representativeness of our samples. On the other hand, the majority of magistrates' courts in E&W are situated in urban centers and the preponderance of defendants appearing before them will exhibit some measure of drug involvement, making a magistrate without some experience of sentencing addicted offenders a rarity.

Our findings also raise a number of interesting questions for further study, in addition to the earlier noted field-based follow-ups. First, while criminal court magistrates are an exceptionally important group to explore - as they are responsible for >95% of criminal decisions in E&W - extending our studies to sample judges in the higher (e.g. Crown) courts, where sentencing powers are more expansive, would provide a more complete understanding of how drug-involved and/or mentally disordered offenders fare in the courts. Indeed, given that higher court judges are legally qualified, and expected to have greater knowledge of and experience with the relevant (liability stage) rules in relation mental health, intoxication and/or wider prior fault doctrines, examining how variables identified in our studies replicate amongst those making decisions in higher courts, and thus to more severe criminal offences, will be of great interest. Second, our findings generalize most directly to magistrate courts in E&W. It would be of interest therefore to examine how criminal courts in other jurisdictions engage with these topics, especially because, while the relevant legal statutes (e.g. prior-fault intoxication rules) and sentencing guidelines exist (in one form or another) across common-

law jurisdictions (including in the US), the wider policy and societal contexts in which they exist differ.

Third, our case vignettes used male offenders only – primarily because for most criminal offence types, males account for the majority of transgressions. However, in light of emerging evidence that acute intoxication is more likely to aggravate at sentencing in cases involving female offenders (Lightowlers, 2019), it would be relevant to examine whether similar patterns emerge in the case of female offenders.

Fourth, while we found no difference as a function of age (15 versus 20 years) of initial drug use in magistrates' sentencing decisions, it would be useful to probe this finding further. Age plays a clear and important role in the appraisal of criminal conduct, both socially and legally, and so it was particularly surprising to find that age in initial drug use did not impact the sentences of addicted offenders. It may be, for example, that our age range (15 and 20) was too narrow and that scenarios where first use starts at, say, 10 or 12, would reveal clearer differences in sentencing. Additionally, other formational or developmental factors known to confer risk for drug use and/or addictive use, such as childhood trauma (Compton et al., 2013), might impact sentencing decisions in similar scenarios. These questions are worthy of future study.

Finally, what might be the impact of instructing magistrates or judges about the biomedical model of drug addiction on sentencing decisions? For instance, work by others demonstrates how even brief instructions on the biological mechanisms of mental conditions can alter perception and judgements, including sentencing decisions in the case of psychopathy (Aspinwall, Brown, & Tabery, 2012). That said, our data suggest that individual magistrates' sentencing decisions were less determined by the credibility of the biomedical account of addiction (or disease) we provided, and more by magistrates' perception of choice in acquisition.

Concluding Remarks

We should be clear that our findings do not serve to identify bias in magistrate sentencers, but rather highlight the consequences of the ambiguity of guidelines which allow for mental disorder to mitigate whilst at the same time holding that alcohol or drug involvement (in the form of intoxication) should be considered generally aggravating. Even when addiction was described to magistrates using explicit disease symptomatology, it failed to garner the same leniency as our disease condition. In the absence of guidance on the sentencing of addicted and substance-dependent offenders in E&W, magistrates' decisions can only be predicated on their individual understanding and personal beliefs. And this is inevitably problematic. First, our studies show that magistrates' approach to addiction at sentencing runs counter to the legal rules and principles at the liability stage, creating a sentencing regime that is unpredictable and that calls for either correction or explicit endorsement. Second, our results reveal broad inconsistencies between individual magistrates in sentencing outcome; inconsistencies that give rise to rule of law concerns, with like cases being treated in very different ways.

Recognizing similar inconsistencies in sentencing (and wishing to highlight the range of available disposal options) the Sentencing Council for E&W has recently consulted on a proposed Overarching Guideline for Sentencing Offenders with Mental Health Conditions or Disorders (The Sentencing Council for England and Wales, 2019). The proposed guideline provides a welcome and important starting point in recognizing various mental disorders (including 'substance misuse disorders') as relevant to sentencing decisions. However, more is needed to address the critical points of legal concern we have identified. Our studies demonstrate that the vast majority of magistrates already recognize addiction as a mental disorder; and that the point of real concern (requiring specific guidance) relates to associated issues of choice in initiation.

Looking forward then, it is essential for the role of prior-fault choices to be clarified in the sentencing of addicted offenders, and equally important in relation to other mental disorders often intertwined with substance-involvement. Specific additional sentencing guidelines are required. As we look to draft and test such guidance, it is now that we encounter a clear normative question that must be answered. What effect, if any, *should* prior-fault choices have? If prior-fault logic *should* apply at sentencing for addicted (and potentially other mentally disordered) offenders, then it should be given direction to achieve greater consistency and sensitivity to the circumstances of historic choices. However, if (in line with the liability stage rules) prior-fault logic should *not* apply to cases involving mentally ill (and potentially addicted) offenders, then this must be clarified to reverse the patterns identified in our studies. In this manner, the next stages of our work will necessarily involve both normative (i.e. what should the law direct) and further empirical study (i.e. how effectively is this achieved in new guidelines). These are crucial debates for the law, and with moral intuitions pulling in different directions, there is a role for neuroscientific insight in directing the debate.

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Table 1.

Odds of sentence reduction in each of the 4 etiology conditions

Condition	<i>M%</i> (<i>SEM</i>)	1	2	3	4
1. Addiction	-7.0 (1.9)	-	0.3***	0.3**	0.1***
2. Addiction-Disease	-20.4 (2.9)	3.6***	-	1.2	0.5*
3. Disease-Addiction	-19.0 (3.0)	2.9**	0.8	-	0.4**
4. Disease	-30.2 (3.2)	7.7***	2.2*	2.7**	-

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

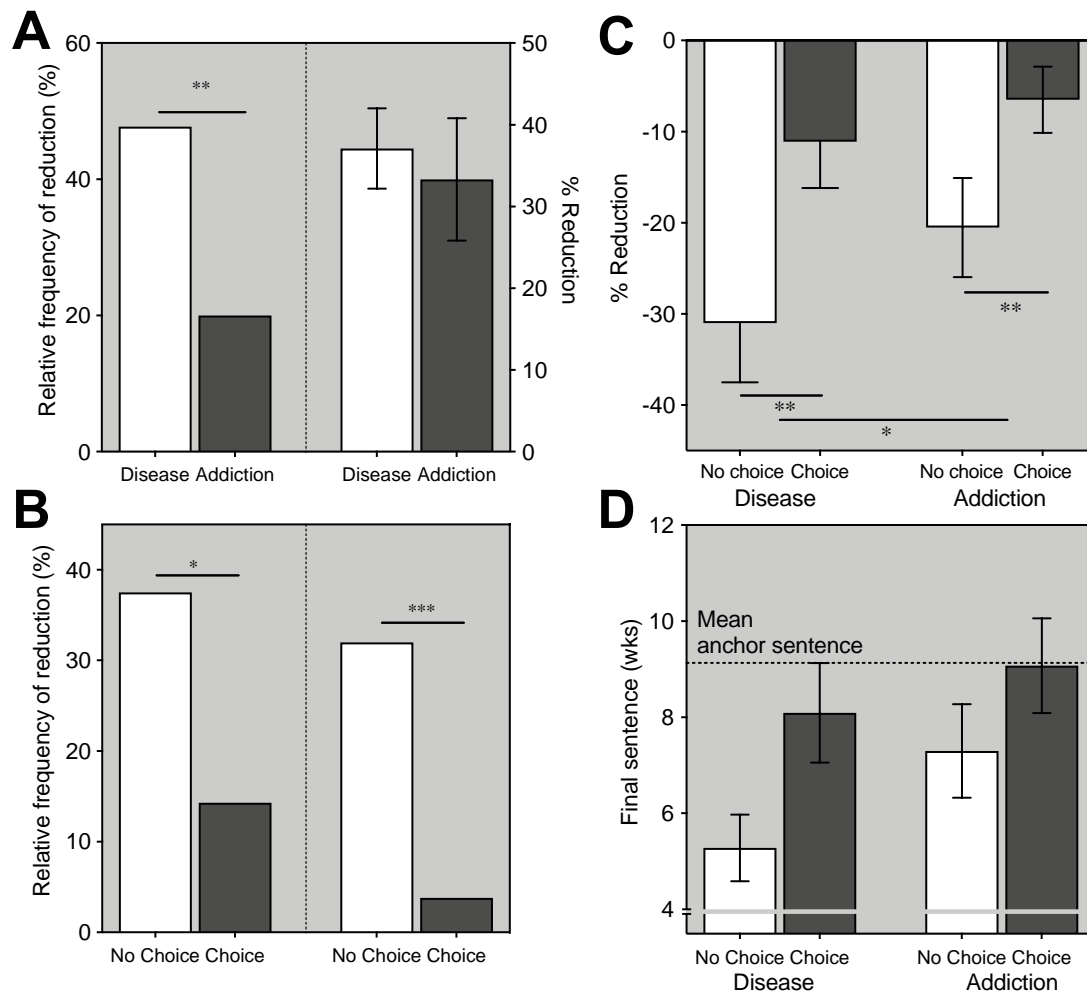


Figure 1. Custodial sentencing decisions by magistrates in response to staged introduction of case evidence (study 1). **(A)** Left panel shows the relative frequency of reduction and right panel shows average (\pm SEM) percentage reduction by respondents that reduced (i.e. excluding non-reducers) from the initial anchor sentence in the disease and addiction etiology conditions; **(B)** relative frequency of sentence reduction as a function of iatrogenic (no choice) and autogenic (choice) origins in the disease and addiction conditions; **(C)** average (\pm SEM) percentage sentence reduction across all adjustment stages; **(D)** average (\pm SEM) final custodial sentences in weeks across as a function of addiction and disease etiology and prior choice/no choice in the acquisition of addiction or disease. * $p < .05$, ** $p < .01$, *** $p < .001$

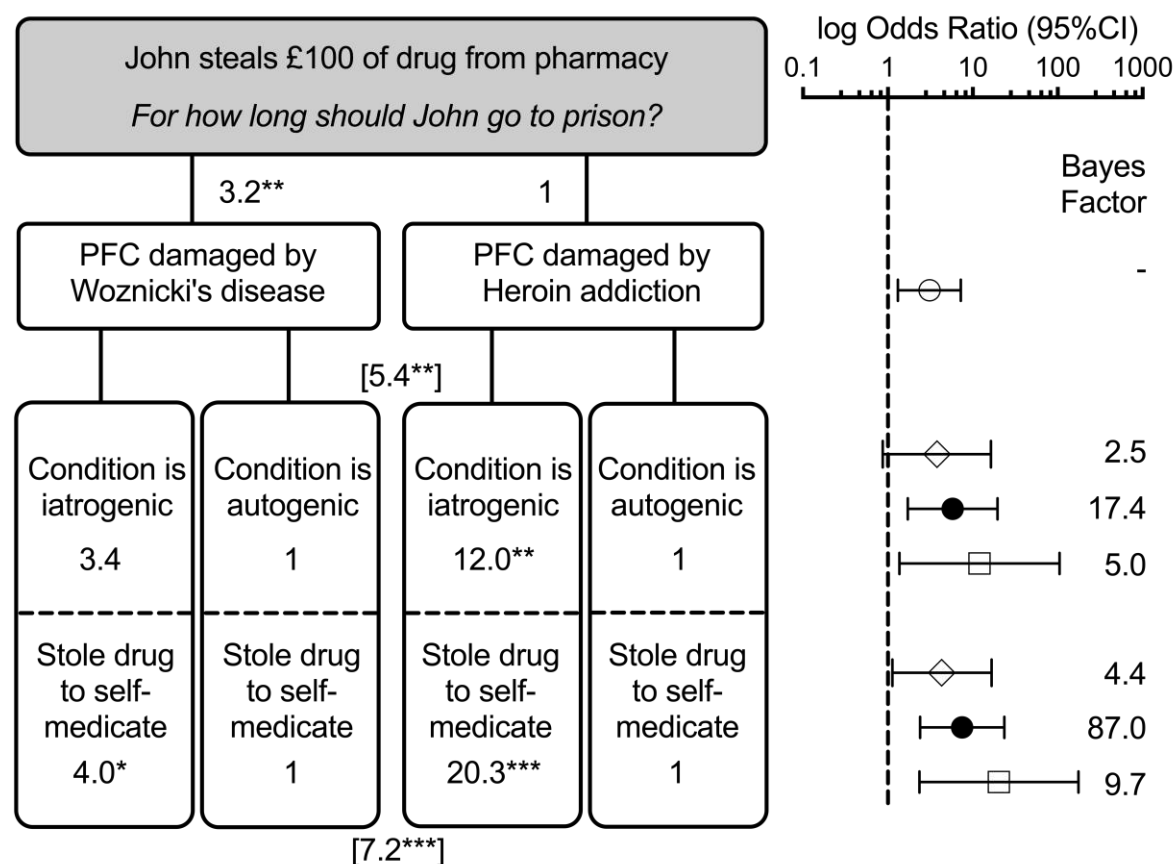


Figure 2. Calculated odds ratios (ORs) and associated Bayes Factors (BF) of sentence reduction by magistrate respondents at the different stages of anchor-and-adjust sentencing (study 1). Open circle = OR for disease versus addiction; open diamonds = OR for iatrogenic versus autogenic origins of disease; open squares = OR for iatrogenic versus autogenic origins of addiction; closed circle = pooled OR. Notes: * $p < .05$, ** $p < .01$, *** $p < .001$.

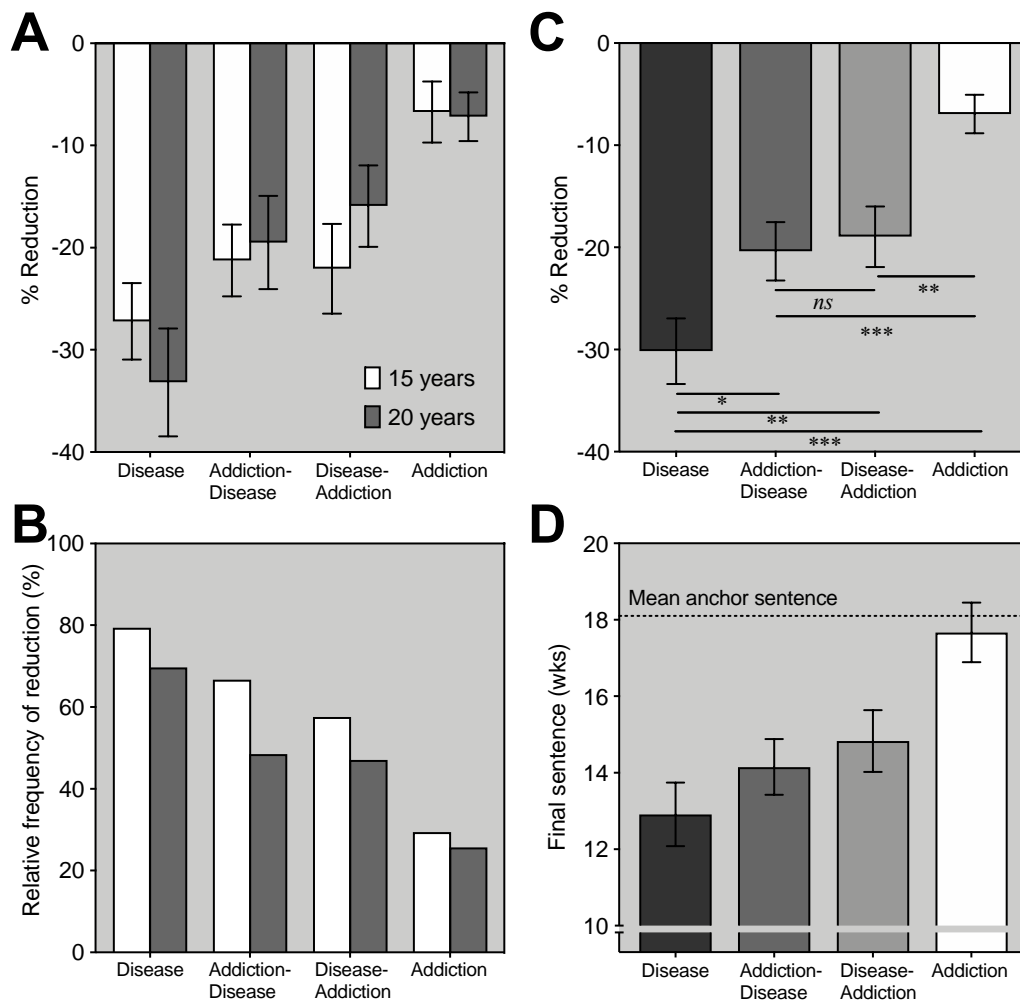


Figure 3. Custodial sentencing decisions by magistrates in response to staged introduction of case evidence as a function of age and/or etiology (study 2). **(A)** Relative frequency of reduction from the initial anchor sentence as a function of age and etiology conditions; **(B)** mean (\pm SEM) percentage sentence reduction as a function of etiology and age; **(C)** mean percentage reduction of custodial sentences by magistrates as a function of addiction, disease or 2 mixed etiology conditions; **(D)** mean (\pm SEM) final sentence given by magistrates in each of the 4 etiology conditions. * p <.05, ** p <.01, *** p <.001

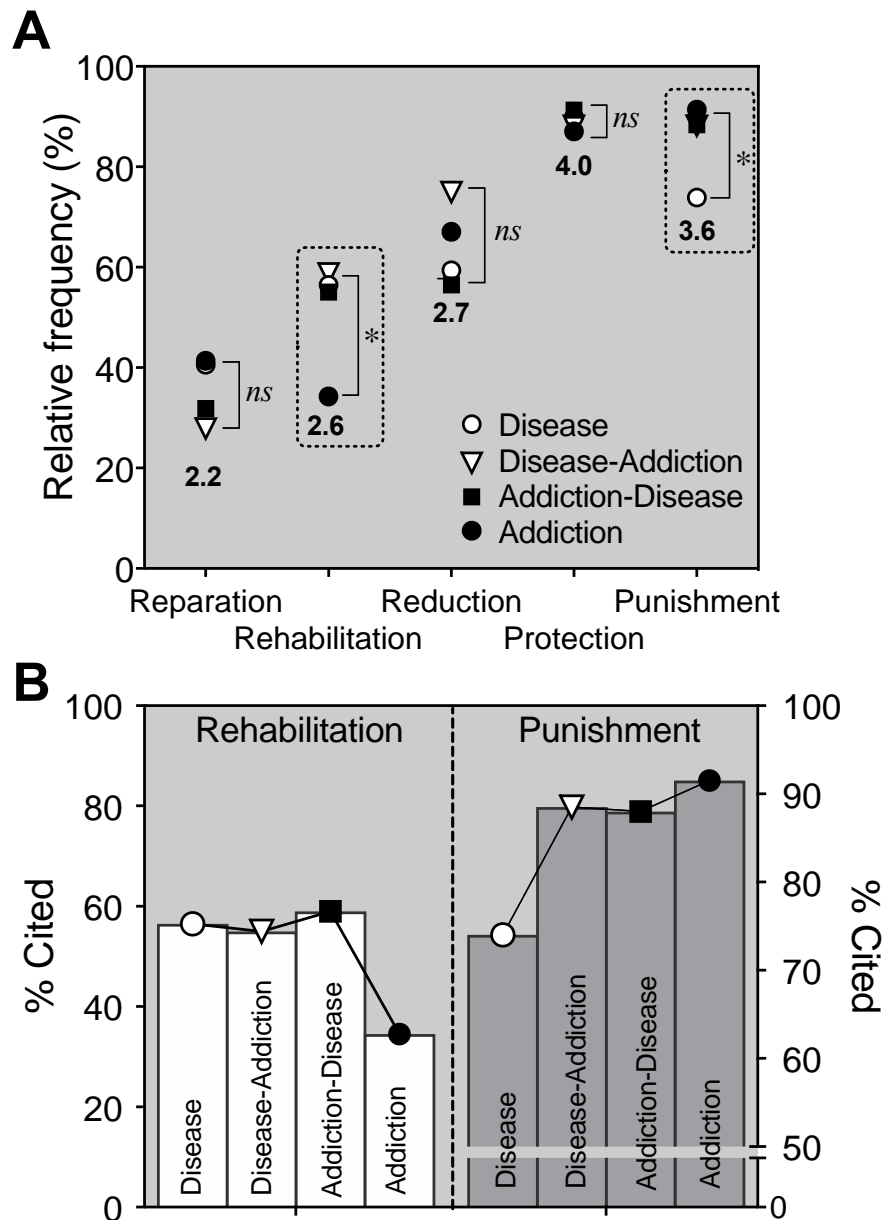


Figure 4. Relative frequencies with which the 5 principles of sentencing were cited as important in magistrates' deliberations. **(A)** overall ranking of principles and differences as a function of etiology condition with bold numbers indicate ranking scores. **(B)** Differences in the cited importance of rehabilitation and punishment across the 4 etiology conditions.

* $p < .05$

Appendix A

Study 1 Materials

The Initial Facts of the Case

All magistrate respondents read the following case vignette (V) and question (Q):

(V) John is 27 years old and unemployed. He has never been convicted of a crime. In January of this year he broke into a pharmacy. Having previously worked in the pharmacy as a cleaner, he knew that the staff sometimes left the side door open for the cleaner when they left in the evening. Having waited for the staff to leave, he tried the door and it opened. He entered, went behind the counter and took £100 worth of Vicodin, a prescription semi-synthetic opioid painkiller. John was identified by two eye-witnesses leaving the premises and arrested later that evening. Faced with an overwhelming case for the prosecution, he has entered a plea of guilty to the charge of non-domestic burglary.

Guidelines suggest that John be sentenced to serve between 10 and 26 weeks.

Optionally, his sentence may be reduced in light of John having entered a guilty plea. Your task is to decide the appropriate sentence.

(Q) For how many weeks should John go to prison?

Adjustment Stage 1: Addiction versus Disease

Depending on which of conditions a respondent was assigned to (Addiction versus Disease), they read the following case vignette (V) and question (Q):

Addiction conditions.

(V) John is addicted to heroin, an illegal opioid drug. Heroin use reduces grey matter volume in the prefrontal cortex, an area of the brain associated with action inhibition. Damage to this area has been demonstrated to result in impulsive behavior and a lack of self-control.

(Q) For how many weeks should John go to prison?

Disease conditions.

John has Woznicki's disease, a rare impulse control disorder characterized by reduced grey matter volume in the prefrontal cortex, an area of the brain associated with action inhibition. Damage to this area has been demonstrated to result in impulsive behavior and a lack of self-control.

For how many weeks should John go to prison?

Adjustment Stage 2: Addiction versus Disease and Iatrogenic versus Autogenic

Depending on which of conditions a respondent was assigned to (Disease-Iatrogenic versus Disease-Iatrogenic versus Addiction-Iatrogenic versus Addiction-Autogenic), they read the following case vignette (V) and question (Q):

Disease-iatrogenic condition.

(V) John was in his late teens when his disease manifested. Treatment at this early stage would have prevented the later onset of symptoms such as impulsivity and anti-social behavior. However, the early signs of the disease went unnoticed by his doctor and his condition grew more severe. The doctor in charge of John's care later faced disciplinary charges for this and several other instances of professional misconduct.

(Q) For how many weeks should John go to prison?

Disease-autogenic condition.

(V) John was in his late teens when his disease manifested. Treatment at this early stage would have prevented the later onset of symptoms such as impulsivity and anti-social behavior. However, although the early signs of the disease were noticed by his doctor, John chose not to receive treatment and his condition grew more severe. Six months earlier, his doctor had diagnosed him as suffering from depression, and John

says that he refused to receive treatment because of the depression that he was suffering at the time.

(Q) For how many weeks should John go to prison?

Addiction-autogenic condition.

(V) John was in his late teens when he became addicted. Six months earlier, his doctor had diagnosed him as suffering from depression. John says that he began taking heroin because of the depression that he was suffering at the time.

(Q) For how many weeks should John go to prison?

Addiction-Iatrogenic condition

(V) John was in his late teens when he became addicted. He was hit by a car and spent several weeks in hospital, during which time he was regularly receiving morphine, an opioid painkiller. His regimen of painkillers was mismanaged and, although he recovered from his physical injuries, John had developed an addiction to morphine by the time he left the hospital. He says this led to him becoming a heroin user. The doctor in charge of John's care later faced disciplinary charges for this and several other instances of professional misconduct.

(Q) For how many weeks should John go to prison?

Adjustment Stage 3. Causal Nexus Between Offense and Neuropsychiatric Profile

Depending on which of conditions a respondent was assigned to (Addiction versus Disease), they read the following case vignette (V) and question (Q):

Addiction conditions

(V) John wants to stop taking heroin. He says that Vicodin helps with the worst symptoms of withdrawal, but it cannot be prescribed to him as it is not an approved treatment. John says that is why he stole the Vicodin.

(Q) For how many weeks should John go to prison?

Disease conditions

(V) John says Vicodin helps with the worst symptoms of his disease, but it cannot be prescribed to him as it is not an approved treatment. John says that is why he stole the Vicodin.

(Q) For how many weeks should John go to prison?

Adjustment Stage 4. Suspended Sentence and Treatment

All respondents read the following case vignette (V) and question (Q):

(V) John has volunteered to receive treatment for this condition. This will require him to attend a 12-week residential course at a treatment facility. The law allows for his sentence to be suspended so that he can be treated. This means that he will not go to prison unless he breaks the law again during his sentence.

(Q) Will you suspend John's sentence so that he can attend a 12-week residential treatment facility? Yes/No.

(Q) IF YES: For how many MONTHS should John's suspended sentence last?

(Q) IF NO: For how many weeks should John go to prison?

Appendix B

Study 2 Vignettes and Procedures

The Initial Facts of the Case: Anchor-sentence

All respondents read the following case vignette (V) and question (Q):

(V) David is a young man with no previous convictions. He was waiting for a train at his local station when he noticed an elderly woman who had a significant amount of money in her purse, which she had placed beside her on a bench. David snatched the purse and ran.

Transport police located him on CCTV and apprehended him shortly afterwards. He was no longer in possession of the purse but did have a substantial sum of money in his possession. David pleaded 'not guilty' to the charge of Theft (Theft Act 1968, s. 1).

David has now been found guilty at trial, with the following factors contributing to the seriousness:

- Vulnerable victim
- Large sum of money (approximately £1000)
- Victim suffered emotional shock and distress
- Victim now too afraid to travel independently.

Sentencing guidelines suggest an appropriate sentence would fall within the range of 6 to 26 weeks custody.

(Q) For how long should David go to prison?

Adjustment Stage

Depending on which of conditions a respondent was assigned to (Addiction-alone, age 15 or 20 versus Disease-alone, age 15 or 20 versus Addiction-Disease, age 15 or 20

versus Disease-Addiction, age 15 or 20), they read the following case vignette (V) and question (Q):

Addiction alone condition; onset at either 15 or 20 years of age

(V) David suffers from damage to his prefrontal cortex, an area of the brain involved in action inhibition. Damage to this area has been demonstrated to result in impulsive behaviour and a lack of self-control.

David's neurological condition was directly causal to his commission of the crime. David has a history of increasingly impulsive behaviour, although this is the first occasion on which it has resulted in the involvement of the criminal justice system.

Six years ago, when David was 15 OR 20 years old, he began taking Heroin. The damage to his prefrontal cortex has resulted from addiction to Heroin.

If you wish to, you may adjust your sentence in light of this additional information.

(Q) For how long should David go to prison?

Addiction leading to disease condition; onset at 15 or 20 years of age

(V) David suffers from damage to his prefrontal cortex, an area of the brain involved in action inhibition. Damage to this area has been demonstrated to result in impulsive behaviour and a lack of self-control.

David's neurological condition was directly causal to his commission of the crime. David has a history of increasingly impulsive behaviour, although this is the first occasion on which it has resulted in the involvement of the criminal justice system.

Six years ago, when David was 15 OR 20 years old, he began taking Heroin. As a result of this, he developed a rare neurological disease called Woznicki's syndrome, a degenerative disorder associated with progressively impaired behavioural control. The damage to his prefrontal cortex has resulted from Woznicki's syndrome.

If you wish to, you may adjust your sentence in light of this additional information.

(Q) For how long should David go to prison?

Disease-alone condition; onset at 15 or 20 years of age

(V) David suffers from damage to his prefrontal cortex, an area of the brain involved in action inhibition. Damage to this area has been demonstrated to result in impulsive behaviour and a lack of self-control.

David's neurological condition was directly causal to his commission of the crime. David has a history of increasingly impulsive behaviour, although this is the first occasion on which it has resulted in the involvement of the criminal justice system.

Six years ago, when David was 15/20 years old, he developed a rare neurological disease called Woznicki's syndrome, a degenerative disorder associated with progressively impaired behavioural control. The damage to his prefrontal cortex has resulted from Woznicki's syndrome.

If you wish to, you may adjust your sentence in light of this additional information.

(Q) For how long should David go to prison?

Disease leading to addiction; onset at 15 or 20 years of age

(V) David suffers from damage to his prefrontal cortex, an area of the brain involved in action inhibition. Damage to this area has been demonstrated to result in impulsive behaviour and a lack of self-control.

David's neurological condition was directly causal to his commission of the crime. David has a history of increasingly impulsive behaviour, although this is the first occasion on which it has resulted in the involvement of the criminal justice system.

Six years ago, when David was 15/20 years old, he developed a rare neurological disease called Woznicki's syndrome, a degenerative disorder associated with progressively

impaired behavioural control. In the wake of this diagnosis, David began taking Heroin. The damage to his prefrontal cortex has resulted from addiction to Heroin.

If you wish to, you may adjust your sentence in light of this additional information.

(Q) For how long should David go to prison?

Once participants had chosen to increase, decrease or leave unchanged their original sentence, several follow-up questions were presented in order to probe the underlying rationale for their decisions.

Final stage

All respondents read the following case vignette and questions:

(V) John has volunteered to receive treatment for this condition. This will require him to attend a 12-week residential course at a treatment facility. The law allows for his sentence to be suspended so that he can be treated. This means that he will not go to prison unless he breaks the law again during his sentence.

(Q) Will you suspend John's sentence so that he can attend a 12-week residential treatment facility? Yes/No.

(Q) IF YES: For how many MONTHS should John's suspended sentence last?

(Q) IF NO: For how many weeks should John go to prison?

Appendix C

Supplementary Result Tables Study 2

Table C1.

Differences in the mean percentage sentence reduction as a function of age per etiology condition (n=270).

Etiology condition	Age 15		Age 20		<i>U</i>	<i>z</i>	<i>p</i>
	%	<i>SD</i>	%	<i>SD</i>			
1. Addiction	6.7	(17.4)	7.2	(14.1)	579.5	-.23	<i>ns</i>
2. Addiction-disease	21.3	(20.5)	19.5	(26.2)	496.5	-.84	<i>ns</i>
3. Disease-addiction	22.4	(25.2)	15.9	(23.2)	471.0	-1.2	<i>ns</i>
4. Disease	27.2	(21.8)	33.2	(23.2)	503.5	-.73	<i>ns</i>

Table C2.

Odds of sentence reduction as a function of age and etiology condition.

Etiology condition	Odds Ratio	χ^2	<i>p</i>	BF
1. Addiction	1.2	0.07	<i>ns</i>	.51
2. Addiction-disease	1.9	1.74	<i>ns</i>	1.43
3. Disease-addiction	1.4	0.53	<i>ns</i>	.72
4. Disease	1.6	0.53	<i>ns</i>	.92

Table C3.

Differences in mean final custodial sentences as a function of age per etiology condition.

Etiology condition	Age 15			Age 20			<i>U</i>	<i>z</i>	<i>p</i>
	<i>n</i>	Final sentence	<i>SD</i>	<i>n</i>	Final sentence	<i>SD</i>			
1. Addiction	35	17.4	(6.4)	35	18.2	(6.7)	563.0	-.59	<i>ns</i>
2. Addiction-disease	35	14.3	(5.5)	34	14.1	(6.5)	558.5	-.44	<i>ns</i>
3. Disease-addiction	34	14.5	(6.9)	34	15.5	(6.6)	533.5	-.55	<i>ns</i>
4. Disease	35	13.8	(6.7)	34	11.7	(6.7)	493.5	-1.2	<i>ns</i>

Table C4.

Estimated probability of future reoffending as a function of age and etiology conditions.

Etiology condition	Age 15			Age 20		
	<i>n</i>	Est %	<i>SD</i>	<i>n</i>	Est %	<i>SD</i>
1. Addiction	35	65.1	(18.5)	35	66.4	(17.1)
2. Addiction-disease	35	65.6	(17.8)	34	68.2	(20.1)
3. Disease-addiction	34	61.4	(19.0)	34	64.9	(22.1)
4. Disease	35	65.1	(16.5)	34	63.2	(21.6)